been, it is still a useful guide to much of the literature on genetic aspects of human cancer.

IAN LECK

Mutation Research. Problems, Results and Perspectives.
By Charlotte Auerbach. (Pp. xviii + 465; Figures + Tables £10·50.) London: Chapman and Hall. 1976.

I find it very difficult to be objectively critical of the above book, since my own work on mutagenesis has been for some seven years directly, and subsequently indirectly, greatly influenced by Lotte Auerbach's ideas and outlook. In my opinion Professor Auerbach has written a unique and valuable book, in which is distilled the knowledge resulting from over three decades of work in mutagenesis. The 23 chapters provide a refreshing blend of historical perspective on early results, comparative viewpoints across the whole range of organisms studied, and critical incisiveness. Following early chapters dealing with the historical development of the subject, and the nature of mutations, *x*-ray and ultraviolet mutagenesis are dealt with in considerable detail. This is followed by several chapters on chemical mutagens, and others dealing with selected topics of continuing interest in mutagenesis such as completes and mosaics, mutagen specificities, spontaneous mutations, and instabilities. The final chapter covers the varied types of applied mutation research. As a reviewer my only regret is that the increasingly recognized importance of environmental chemical mutagens is not reflected in the mere 3-page coverage afforded in this book. One would certainly have welcomed Professor Auerbach's critical and authoritative appraisal of the various test systems currently being used to detect environmental mutagens.

It is to be hoped that this book will be available to all undergraduates taking final year genetics courses. It will be invaluable to all postgraduates and research workers involved in mutation research or testing, regardless of their particular organism or mutagen of choice. It is clearly printed and provided with numerous references to additional reading.

COLIN H. CLARKE

Haemoglobin: Structure, Function and Synthesis.
(*British Medical Bulletin*, Vol. 32, No. 3, September 1976.) Scientific Editor: D. J. Weatherall. (£3·00.) London: British Council. 1976.

Structure, Function and Synthesis of Haemoglobin is a suitable subject for the *British Medical Bulletin*. Britain has been foremost in its contribution to this field, and Dr Weatherall, the scientific editor has assembled a distinguished array of contributors of whom everyone is recognised internationally as a prominent expert.

M. F. Perutz contributes an introduction as well as a survey of the structure of haemoglobin and of the structural alterations involved in the change from oxy- to deoxyhaemoglobin. In the introduction, Perutz asks what is it that makes the study of haemoglobin so absorbing. It is of course the fact that the haemoglobin is a two-way respiratory carrier, transporting oxygen from the lungs to the tissues and facilitating the return transport of CO_2. It fulfils this dual function by a reversible change of its structure so that the arterial form of haemoglobin has a high affinity for oxygen and a low one for hydrogen, chloride ions, CO_2, and organic phosphates with these relative affinities reversed in the intravenous form. Perutz quotes Monod who conferred on haemoglobin the title of an 'honorary enzyme' calling the haem its active site, oxygen its substrate, and hydrogen ions its inhibitor. Organic phosphates which preferentially combine with the deoxy structure would then be allosteric cofactors.

J. B. Kilmartin details the interaction of haemoglobin with 2, 3-diphosphoglycerate, protons, and CO_2, and J. M. Baldwin defines the Adair constants, oxygen equilibria, and co-operative interaction. Against this background J. M. White describes the unstable haemoglobins where the delicately balanced interactions between hydrophobic amino acid residues and the haem, as well as other intramolecular and subunit interactions, are disturbed. The distinctive role as a precipitating agent of the superion released in imbalanced oxygenation is described in what is perhaps the first fully understood molecular disease. A. J. Bellingham contributes a similar analysis of the alteration in the oxygen affinity based on changes in molecular structure. A. May and E. R. Huehns discuss the sickling process, both *in vitro* and *in vivo*. It is not yet fully understood what happens when the sickle cell haemoglobin forms monodirectional crystals, but it is becoming quite clear that insoluble helical strands of molecules are formed and that these molecules interact with each other.

There is a very thorough survey of the genetics of human haemoglobins assisted by what is now known of haemoglobin variants fusion and the products of crossing-over and deletions by A. Lang and P. A. Lorkin with some very clear illustrations.

R. Williamson describes the measurement of globin genes in animals and man. The number of human haemoglobin genes can now be expected to be in the range of 8 to 10 of which 2 are α chain genes, 1 each a β and a δ chain gene, and the rest to be divided between the γ, ε, and ζ chain genes.

N. J. Proudfoot and G. G. Brownlee describe